



EC Diesel Program Interim Report

- **Program Review**
- **Initial Emission Results**
- **Mileage**



EC D Demonstration Program Participants

- **Agencies**
 - National
 - DOE and NREL major supporter & working group member
 - EPA review and comment on test program
 - California
 - CARB, SCAQMD and CEC are members of working group
- **Academia**
 - West Virginia University
 - UC Riverside
- **Industry**
 - Engelhard and Johnson-Matthey with support from Corning, NGK-Lock and Fleetguard Nelson
 - Cummins, Detroit Diesel, Ford and International
- **Fleet operators**



EC D Demonstration Program Participants

		Operating on ECD				
		Retrofitted w/ Catalyst		Operating on ECD Only		
		Johnson-Matthey	Engelhard			
Fleet Managers	Fleets Participating	Johnson-Matthey	Engelhard	Operating on ECD Only	Operating on CARB Diesel	Total Vehicles
ARCO	ARCO Distribution	5	5	9	10	29
International	San Diego School District	5	5	10	10	30
Cummins	LA City Sanitation	5	5	2	3	15
Detroit Diesel	Santa Monica Big Blue Bus	Never Started up because of contract issues				
Detroit Diesel		5	0	10	0	20
ARCO	Los Angeles MTA	2		8	8	18
Ford	Hertz Equipment Rental (LA)	5	5	5	5	20
NREL	Ralphs Grocery	5	5	5	5	20
Total Vehicles		32	25	49	41	152

Operating on EC Diesel with a Particulate Filter

Operating on EC Diesel

Operating on CARB Diesel



Fuel Analysis Results

1st Round of testing
Test Fuel Properties (1 Sample)

Property	CARB	ECD	ECD-1
Cetane Number	54.1	64.7	51.3
Sulfur, ppm	121	7.4	13.1
SFC Aromatics			
Total, vol%	22.5	10.9	23.8
PNA, wt%	4.1	0.9	2.8



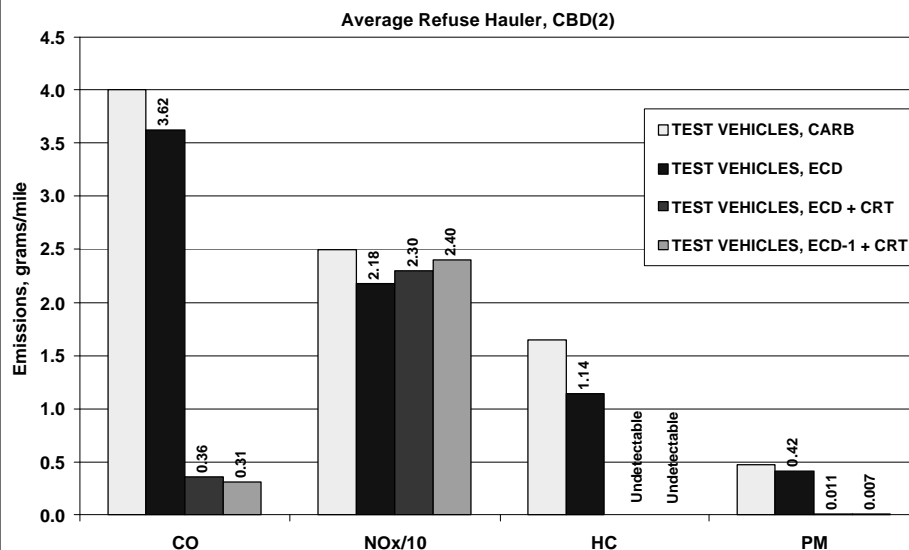
LA City Refuse Haulers

- 1999 Peterbuilt 320
- Cummins L10 305 HP
- Automatic 5 speed transmission
- 58,000 lbs GVW, 40,600 lbs test weight
- Johnson Matthey CRT (continuously regenerative technology)



Average Refuse Hauler Emissions

Each Bar is 2 vehicles, 3 runs per vehicle





Mileage Accumulation

- Current Mileage Accumulation by fleet

	<i>Ralphs</i>	<i>ARCO</i>	<i>San Diego</i>	<i>LA MTA</i>
Min	125,553	112,000 *	40,249	38,400
Average	142,553	169,300	44,096	44,300
Max	156,320	239,000	47,008	50,200

* Filter removed for in lab durability testing at 112,000 miles



EC Diesel Program Summary

- 1st round emission testing illustrate PM HC & CO reduced >90%
- 2nd Round emission testing completing
 - Toxics and speciation samples collected after one year of operation samples at DRI for analysis
- Additional information (www.ecdiesel.com)
 - SAE Publications to date:
 - 2000-01-1854, 2000-01-2821, 2000-01-2815, 2001-01-0512
- CARB verification required for continued expansion of technology into market
 - Executive Orders permit sale, market demanding verification



Back Up Materials



EC D Demonstration Program Deliverables

- Emission data
 - reduction from fuel change
 - reduction from fuel change and passive regenerating particulate filters
- Toxic, speciation and sizing data
 - with and without catalyst
- Durability information
 - low sulfur/aromatic high cetane fuel
 - passive regenerating particulate filters



Emissions Test Plans

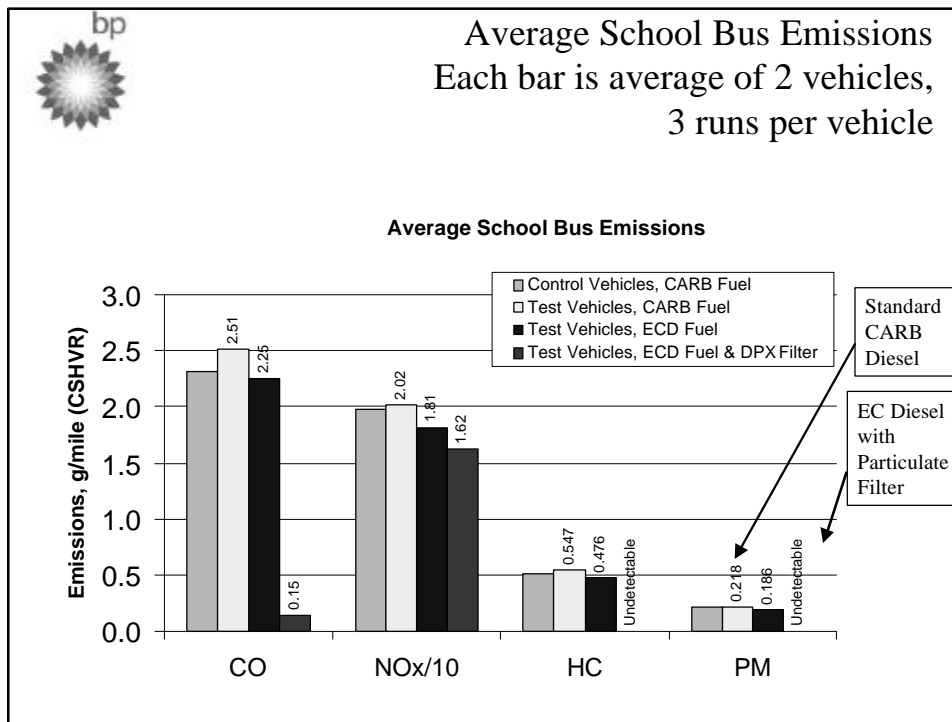
- Main Plan prepared by working group in November of 99
 - NREL, industry participants, CARB, SCAQMD, CEC, DOE
 - Reviewed by U.S. EPA
 - First round completed - WVU transportable laboratory (36 vehicles)
 - Second round in process- WVU transportable laboratory
- Hertz/Ford Plan prepared by UC Riverside and working group in November 1999
- Toxic, Speciation and Particulate Sizing Plan developed
 - WVU to pull samples
 - DRI to analyze
- Double-length driving schedules were run for aftertreatment-equipped vehicles to collect enough PM
- Detection limits
 - HC = 3ppm or less (ambient), PM=0.0004 g/mile or less



San Diego School Buses

- 1998 American Transportation 3000RE / International chassis
- International 530E 8.7 liter I6 turbo, 275 hp
- Automatic transmission, 5 speed
- Engelhard DPX catalyzed soot filter
- 32,200 lb test weight





bp

ARCO Tanker Trucks

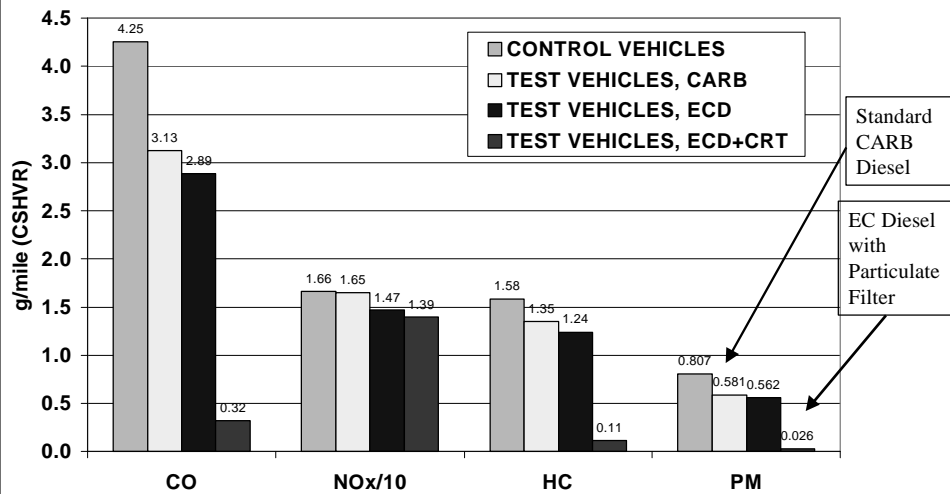
- Kenworth chassis
- 1995 & 96 Cummins M11 10.8 litre turbocharged diesel, 330hp
- 10 spd. manual transmission
- Johnson Matthey CRT (continuously regenerative technology)
- 32,200 lb test weight



Average Tanker Truck Emissions

Each bar is average of 2 vehicles, 3 runs per vehicle

Average Tanker Truck Emissions



Ralphs Grocery Trucks

- Sterling L-line chassis,
- 1999 Detroit Diesel Series 60,
- 12.7 liter turbocharged diesel, 430hp
- 10 spd. manual transmission
- Johnson Matthey CRT and Engelhard DPX
- 42,000 lb test weight
- Twenty trucks tested to investigate vehicle-to-vehicle variability





Average Grocery Truck Emissions

Each Bar is 5 vehicles, 3 runs per vehicle

